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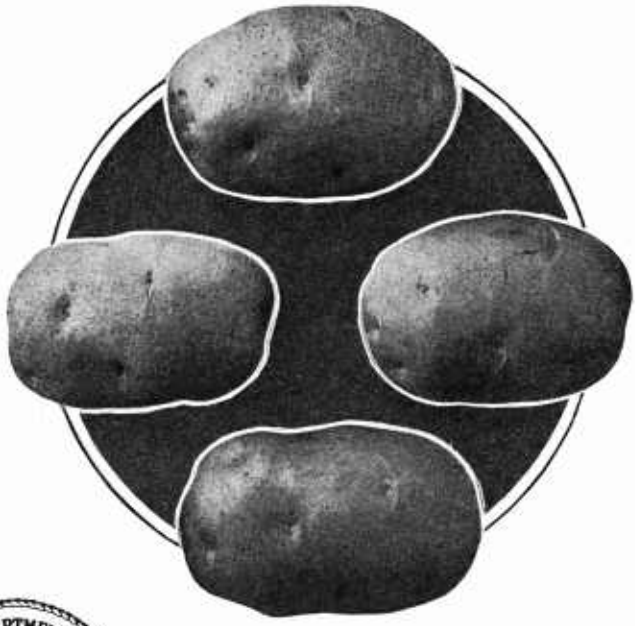
SEED POTATOES AND HOW TO PRODUCE THEM



THE IMPORTANCE of planting good seed potatoes is not appreciated as fully as it should be. Good seed is one of the determining factors in profitably producing maximum crops of potatoes.

The quality of the seed can be improved by removing all diseased, weak, or off-type plants as soon as they are observable.

Good seed can be produced only by giving the growing plants good cultural attention.

Only seed from productive plants should be used.

Seed should be free from varietal mixture and true to type.

Good storage conditions are essential in insuring sound, firm seed at planting time.

All seed stock should be disinfected before it is planted.

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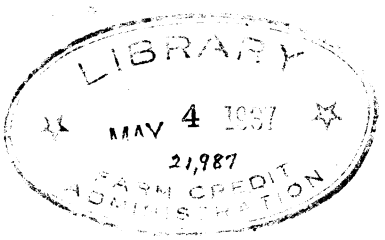

SEED POTATOES AND HOW TO PRODUCE THEM

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IMPORTANCE OF GOOD SEED

THE USE OF GOOD SEED is especially important in lowering the unit cost of potato production. Lowering unit cost does not necessarily mean lowering the quality or the price of a bushel of potatoes, but, rather, furnishing a better product without increasing the cost of its production. The progressive potato grower's aim should be to produce as many profitable bushels per acre as possible.

Two factors determine the quality of seed potatoes: (1) The physical or outward appearance of the tubers and (2) the heritable or transmissible characters of the stock. The first involves the purity and maturity of the stock, uniformity in size and shape of the tubers, brightness of skin, firmness of flesh with first sprouts just showing, and freedom from scab, Rhizoctonia, late blight, or other tuber-decay diseases. The second factor deals with nonobservable characters and is by far the most important, as it involves the presence or absence of the virus diseases causing mosaic, leaf roll, spindle tuber, streak, and yellow dwarf. Freedom from the virus diseases is important and can only be assured by inspection of the growing plants from which the seed was obtained or by the purchase of reliably certified stock.

DEVELOPMENT OF HIGH-GRADE SEED

SELECTION METHODS

The chief improvement to be made in seed-potato stocks by selection methods is the elimination of diseased and weak plants and of varietal mixtures. Experimental evidence seems to indicate that the possibilities of improving seed stock by selective practices alone are not so great as has been claimed, and that the chances of

finding superior-yielding, true-to-type strains within a variety are more limited than was once believed.

Five methods of improvement may be used in obtaining a commercially desirable strain of potatoes: (1) The tuber-indexing method, (2) the tuber-unit method, (3) hill selection, (4) mass selection, and (5) field roguing.

TUBER-INDEXING METHOD

The tuber-indexing method of seed-potato improvement is the most recently devised and most effective method of eliminating diseased, weak, and low-yielding potato tubers from seed stock intended for planting in the seed plot. The work is usually done during the winter. The first step is to select as many tubers, each weighing from 7 to 9 ounces or thereabouts, as greenhouse, hotbed, or outdoor space will accommodate. The next step is to number each tuber for identification and then remove a seed piece or set from each, preferably from the seed end, although any strong eye will serve. This set is then put in a suitable-sized pot (the 3½ or 4-inch size is satisfactory), or it may be planted in a greenhouse bench or hotbed. In either case the set must be labeled with the number of the tuber from which it was taken. The plants produced from these seed pieces are carefully observed for virus diseases, such as the various types of mosaic, leaf roll, spindle tuber, and the yellow dwarf. All plants showing any of these diseases or any sign of weakness are noted, and the seed tubers from which the sets were taken are discarded. In this way it is possible to get rid of most if not all of the diseased tubers before planting them.

The best method of handling the mother tubers from which the index sets have been removed is to hold them for 10 days to 2 weeks in a temperature of 60° to 70° F., after which they may be held at 40° to 45° until planting. The higher temperature with relatively high humidity favors thorough healing of the cut surface.

The extent to which this work can be done in the North, except in regions where a late or fall crop of potatoes can be grown, is necessarily limited to the greenhouse or hotbed space available. Where a fall or second crop is grown, as in southern New Jersey, the Eastern Shore of Maryland and Virginia, and practically all of the Southern States, it is possible to practice the tuber-indexing method with the spring crop by planting the set from the numbered tuber in the open field and properly labeling it. Observations can be made during the growing season in ample time for a second-crop planting of indexed tubers that are apparently free from disease as well as from any inherent weakness. By doing such work in the far South it would be possible to grow the indexed set to full maturity before the normal planting period in the North. In fact, certain State seed-certification agencies are now resorting to this practice in order to get a "reading" on the behavior of their certified strains of seed potatoes. At the usual planting time the tubers found to be free from disease are planted in a seed plot by themselves, the pieces from each tuber being planted separately. It is then easy to identify, in the growing plants, any disease from an infected tuber that may have escaped the observer of the tuber-index set. From this point in the process the practices are the same as those under the tuber-unit method.

TUBER-UNIT METHOD

The tuber-unit method consists in selecting from the seed bin before planting time a considerable number of the most perfectly shaped tubers ranging from 6 to 8 ounces in weight. In planting, these tubers are quartered, as dropped, into parts as nearly equal as possible, by splitting the bud-eye cluster twice from seed to stem end of the tuber. In other words, the tuber is cut through its longitudinal axis. The four pieces of each tuber are dropped consecutively in the row, 10 to 12 inches apart. All tubers showing discoloration of the flesh or other evidence of disease should be rejected. By allowing an additional spacing between sets of fours, the four plants from each tuber are definitely isolated and the grower can readily observe any variation in vigor and uniformity among the various units planted. This method also enables him to detect any mixtures in the variety. All mixtures should be removed at once. The units that appear most uniform in size, vigor, and type when the plants are still in vigorous growth are marked, and the first step in selection has been accomplished. At digging time the product of each unit is separately harvested and a further selection made from the marked units of all tubers which most nearly approach the size, shape, and smoothness desired. The selected tubers of each unit should be separately placed in small sacks, preferably cotton or burlap, numbered with both field and unit numbers, and stored to await further examination. The final examination should produce data on the number and weight of merchantable and unmerchantable tubers and their general conformity in size, shape, and smoothness to the type desired. From each of the units retained 10 of the best tubers should be selected for the next season's planting.

It is desirable to maintain the study of each selection on the tuber-unit basis the following season, because it permits a more accurate comparison of the behavior of each. The 10 selected tubers from each original unit will give 40 plants for study the second year. All selections which do not produce a reasonably uniform lot of plants should be rejected. At harvest time the progeny of each selection should be kept by itself and the same data recorded as those taken on the crop grown from the original tuber unit. Only the products from such 40-hill rows as meet the most rigid requirements should be retained. The further work will consist in multiplying the selected strains for field planting and eliminating the weak plants.

HILL SELECTION

The hill-selection method consists in marking the most promising plants during the growing season and at harvesting time saving only the progeny of the best. (Figs. 1 and 2.) The progeny of each hill should be kept separate and the same data taken as outlined for the tuber unit. Plant on the tuber-unit or progeny-row basis the following season. For the sake of uniformity a definite number of tubers (five or more) from each hill selection should be planted. Subsequent procedure should follow the practices given for the tuber-unit method.

FIGURE 1.—Progeny of (*A*) a mosaic-infected potato plant of the Triumph variety and (*B*) a healthy plant. Bin selection of such seed would result in taking at least two tubers from the mosaic plant. If small tubers were used all would come from diseased plants. In hill-selection work only the progeny of plant *B* would be saved.

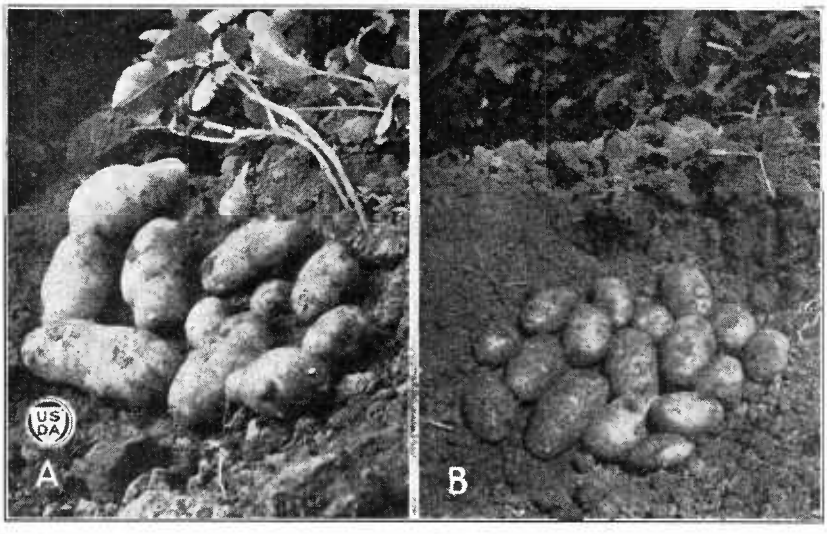

FIGURE 2.—Progeny from (*A*) abnormal and (*B*) normal plants of the Russet Burbank potato. Plant *A* is known in the West as a degenerate or run-out plant, and the disease with which it is affected is probably identical with that termed "spindle tuber." It is a communicable disease and may become serious. In hill-selection work only the progeny of plants such as *B* would be saved.

MASS SELECTION

Mass selection differs from hill selection in only one respect, that is, the tubers from the individually selected plants are not kept separate. Generally growers who practice mass selection do not go to the trouble of marking promising individual plants during the growing season, but simply go through the field before harvesting the whole crop and dig by hand as many plants that show the desired vigor and stem characters thought to be correlated with productiveness, trueness to type, and uniformity in size of tubers of the particular variety grown, as may be desired to secure the necessary quantity of seed.

FIELD ROGUING

By "roguing" vegetable-seed growers mean improving the seed stock by the process of removing all "rogues"—diseased, weak, off-type, or varietally mixed plants—from the field or seed plot during the growing season, when the process is relatively easy. Roguing does not necessarily require an intimate knowledge of the various potato diseases, but it does call for the ability to tell whether a plant is normal or abnormal in appearance. Varietal mixtures are more easily detected when the plants are in bloom. Weak plants are usually easy to detect in the early stages of their growth, as are also certain types of disease such as mosaic and blackleg, although both weakness and disease may appear later. Infection with Rhizoctonia and Fusarium is usually not apparent until the latter part of the growing season. The area should be gone over at least three times during the growing season. In field roguing a sufficient area should be covered the first year to provide enough seed to plant the full acreage that is to be grown the ensuing season. When the crop of the seed plot is harvested, further roguing should be done by discarding the progeny of all low-producing plants. (Fig. 1, *A*.)

RELATIVE MERITS OF THE DIFFERENT METHODS

Careful consideration of all the experimental evidence at hand seems to justify the conclusion that in the hands of an especially trained individual the tuber-indexing method is without doubt the most effective process for eliminating diseased tubers and for creating foundation stock from which to produce high-class seed stock. The tuber-unit method is the next most promising. When it is practiced in connection with hill selection it should prove much more effective than when used in connection with bin-selected stock. The first three methods can be recommended only to those growers and specialists who are capable of giving the thought and time necessary to produce results. Mass selection and field roguing present greater possibilities in the hands of the average grower who does not have time or inclination to give the care required for best results.

The only requirements for the successful practice of the tuber-unit, hill-selection, and mass-selection methods are a reasonable degree of painstaking effort on the part of the grower, some 12-inch garden labels, a small pair of balances, a sufficient number of small sacks, a safe place in which to store the selected tubers until they are required for the next season's planting, and a breeding plot in which each season's selections can be developed into planting stock. The selection

or seed plot should be located as far from the commercial potato field as possible, in order to secure the greatest degree of isolation feasible.

ISOLATION

It is now recommended that in producing seed potatoes under isolation, each variety be grown separately, because it has been found that stocks of certain varieties supposed to be free from mosaic have served as carriers of disease to more susceptible varieties. The ultimate success in using the isolated seed plot in eliminating tuber-borne diseases rests largely on the ability of the grower to recognize diseased plants and his promptness in removing them from the seed plot and destroying them. Heretofore, the factor of isolation has not received due consideration, largely because the seriousness of such diseases as mosaic, leaf roll, curly dwarf, streak, and spindle tuber had not been recognized. The fact that all of these diseases are readily transmitted from diseased to healthy plants through the instrumentality of plant lice or aphids and the further fact that as yet there is no reliable information on the distance over which insects may transport these diseases, suggest an isolation of the seed plot as complete as possible.

Frequent and thorough inspections of the seed plot are necessary to insure the largest possible elimination of diseased plants and to reduce the transmission of disease from diseased to healthy plants.

SEED TREATMENT

It is impossible to produce high-grade seed potatoes if the seed planted is infected with disease organisms capable of infecting the crop. Disinfection of the seed potatoes is therefore necessary if the best results are to follow. The two diseases for which seed potatoes are ordinarily treated are common scab and black scurf, or Rhizoctonia. The two disinfecting agents recommended for such treatment are formalin and corrosive sublimate (mercuric chloride, or bichloride of mercury). Formalin is a trade name for a 40-percent solution of formaldehyde gas. Corrosive sublimate is a white crystalline poisonous compound which goes into solution very slowly in cold water but is readily dissolved in boiling water. The hot-formaldehyde treatment of seed has been found much more effective against black scurf (rhizoctonia) than the cold-solution treatment, and requires a much shorter period of immersion. The formulas recommended for these two disease disinfectants are:

1. Formalin:
   a. Cold treatment:
      Formalin, 1 pint.
      Water, 30 gallons.
   b. Hot treatment:
      Formalin, 2 pints.
      Water, 30 gallons, heated to 125° F.
2. Corrosive sublimate, 4 ounces.
   Water, 30 gallons.

The period of treatment for formula 1, *a*, and for formula 2 is from 1½ to 2 hours when the seed is dormant and one-half to 1½ hours if the tubers are germinated. With formula 1, *b*, on account of the double strength of the solution and the higher temperature of the liquid, the period of treatment is cut to 4 or 5 minutes. In using the hot formaldehyde solution it is necessary to have a reliable

thermometer and a well-controlled method of maintaining a uniform temperature throughout the treatment.

The treated tubers should on no account be allowed to come in contact with such receptacles as sacks and barrels in which diseased seed has been handled, as these articles are almost certain to be sources of reinfection.

SOIL PREPARATION AND CULTURAL PRACTICES

Strong, vigorous plants cannot be produced on land that has been poorly prepared or that is deficient in available plant food. Seed potatoes should be grown on land that has been deeply plowed and thoroughly prepared to receive the seed. It should be well supplied with organic matter and available plant food. A clover or alfalfa sod furnishes the organic matter and considerable plant food. Barnyard manures or commercial fertilizers, or both, will supply the additional plant food necessary.

The vigor of the seed stock produced depends largely on the care given to the growing crop. Uniformity in the size of the tubers is largely governed by the rate of planting. Closer planting should be practiced in growing seed than in growing table stock. Some growers in Aroostook County, Maine, space their rows 32 to 36 inches apart and the plants in the row 8 to 12 inches. The crop should be cultivated as frequently as may be necessary to provide the most suitable growing conditions.

The plants should be sprayed to prevent injury by insect or fungus pests. Leaf-eating insects can be effectively controlled by thorough spraying with arsenical poisons; sucking insects, with contact solutions, such as kerosene emulsion and nicotine; and fungus diseases, such as the early and late blights, with bordeaux mixture. In every operation it should be remembered that whatever contributes to the health of the plant increases the vigor of the seed stock produced.

IMPORTANCE OF TUBER SHAPE AND SIZE

Reasonable trueness of the tubers to varietal type is generally demanded by the purchaser of certified seed. The Irish Cobbler grower in the South demands roundish tubers and is suspicious of the purity of seed stock that contains flattened and somewhat elongated tubers; he generally protests against accepting them as strictly first-class seed stock, and is inclined to regard the off-type tubers as Green Mountain.

However, some scientific workers and practical growers are now disposed to regard tuber shape as being less important than was previously supposed. They have come to regard tubers that have departed from the type because of unfavorable environmental conditions as being satisfactory for seed purposes, and as no more likely to produce off-type progeny than are normal-shaped tubers. This, however, does not apply to tubers that are off-type as a result of disease; such tubers should not be planted. The spindle tuber, now recognized as a communicable disease, is very similar to leaf roll and the mosaic disease in its method of transmission. Figure 2, *A*, pictures a fairly good example of spindle tubers. It is important, therefore, in purchasing somewhat off-type seed potatoes to know

that the change in shape is really due to unfavorable environmental factors and not to disease.

In seasons of short production and consequent high prices for table stock the question of whether it is advisable to use the small, unsalable tubers for seed is frequently raised. It is always unsafe to use small tubers for seed unless it is absolutely certain that they have been produced by healthy, vigorous, and productive plants. It is never advisable to use small tubers from the general production from unselected stock. Some experimental study of this subject by Ballou and Gourley [1] demonstrated that the planting of large tubers gave—

(1) A very high, sometimes almost total, percentage of the high-producing strains.
(2) A high percentage of the average or moderate-yielding strains.
(3) A very low percentage of the inferior or low-producing strains.

The planting of small tubers gave—

(1) A very insignificant percentage of the high-producing strains.
(2) A low percentage of the moderate-yielding strains.
(3) A very high, almost total, percentage of the low-yielding strains.

WHOLE SEED COMPARED WITH CUT SEED

Experimental evidence does not indicate that whole tubers are better than cut tubers as seed, at least in the United States. The data, while conflicting, show that in general and within reasonable limits the larger the seeds planted, the larger the crop. If whole seed is to be planted, small tubers and those from unselected stock should not be used.

The tubers should be germinated before being planted, to insure a minimum number of sprouts. Planting dormant whole tubers causes too many sprouts to develop.

HARVESTING AND STORAGE

The importance of preventing mechanical injury of the tubers during harvesting and storing is not fully realized. If the land contains small stones, the tubers are almost certain to be more severely injured in harvesting than if they were grown in a sandy loam soil. Hand digging is not always feasible, but where small stones abound in the soil it is desirable to harvest the home seed plot by hand.

Much injury will be avoided if, when harvested, the seed stock designed for planting the field plot of the ensuing year is placed directly in crates in which it can remain throughout the storage period.

The storage conditions necessary to insure vigorous seed at planting time are more easily provided in the North than in the South, because it is easier to maintain the proper temperature in that region. In the North a well-constructed cellar, pit, or cave serves reasonably well. The main requirement is to keep the room temperature low enough to retard germination. The ideal seed tuber is one that has not wasted any of its stored-up energy by excessive loss through

[1] The Status of the Potato-Growing Industry in Ohio. II. Seasonal Notes on Potatoes. Ohio Agr. Exp. Sta. Bul. 218.

sprouting. (Fig. 3.) It should be firm, with the first sprouts just showing. Such tubers can be depended upon, under suitable conditions, to start quickly when planted and to make a vigorous growth.

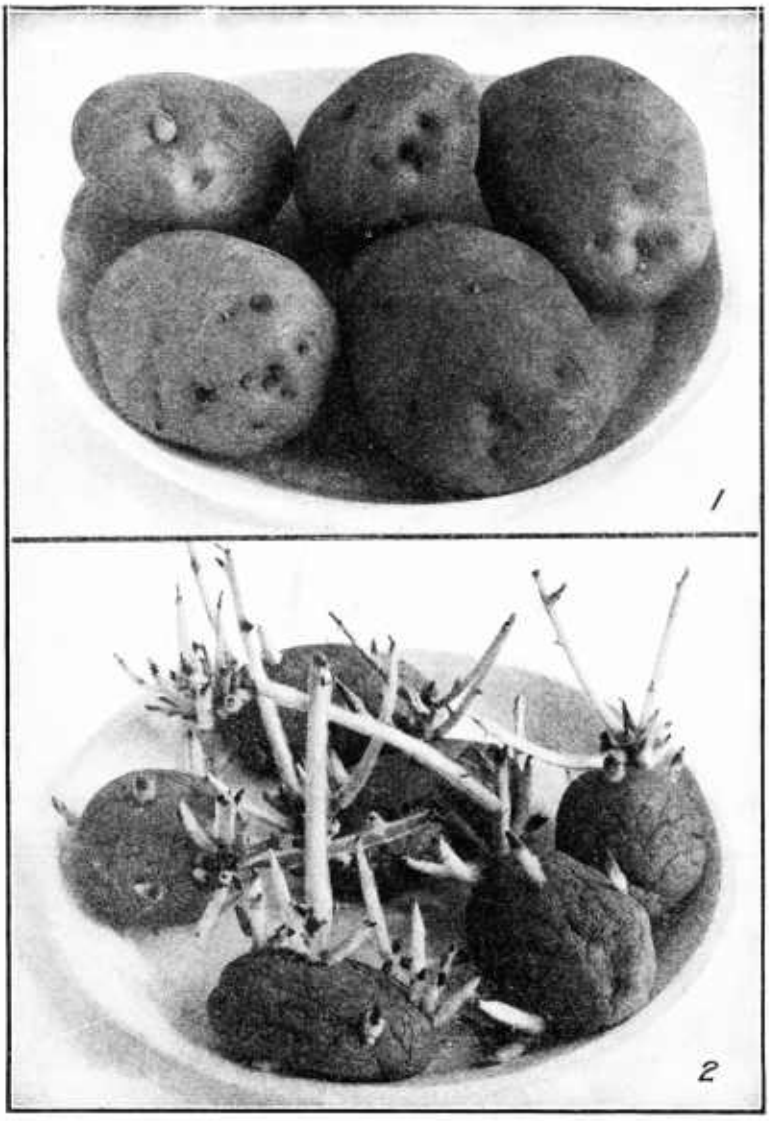

FIGURE 3.—Potatoes to be used for seed, showing different stages of germination: 1, Desirable; 2, undesirable.

In the South, because of the difficulty in preserving proper storage temperatures and thus preventing sprouting, the general practice has been to secure seed stock from the North. This method has difficulties also, because there is always the risk of the seed being chilled, frozen, or overheated while in transit in midwinter. Proper storage

facilities such as described in Farmers' Bulletin 847, Potato Storage and Storage Houses, would allow the southern potato grower to have his seed stock shipped to him as soon as it is harvested in the fall or even to grow his own seed if he desires.

CERTIFICATION OF SEED

The rapid increase in acreage and production of certified seed potatoes, and the higher prices which their growers demand, have made it necessary to demonstrate that certified seed potatoes are superior to ordinary seed potatoes. During the time when the production of certified seed was being developed, there was not enough experimental evidence to support the growers' claims of its superiority. But now there is abundant evidence of that superiority. Data covering actual comparative tests made by a large number of independent investigators are shown in table 1, taken from an address by H. C. Moore before the 1924 annual meeting of the Potato Association of America.

TABLE 1.—*Comparative tests of potato yields, showing the advantage of using certified seed*

Location of tests	Tests or reports	Average increase in yields per acre	Location of tests	Tests or reports	Average increase in yields per acre
	Number	*Bushels*		*Number*	*Bushels*
Canada (8 Provinces)	15	88	Michigan	314	73
Connecticut	144	53	Missouri	46	43
Delaware	21	83	Montana	2	219
Illinois	15	47	Nebraska	64	141
Indiana	9,740	44	New York	68	76
Kansas	11	41	Ohio	168	48
Kentucky	220	42	Oregon	3	150
Louisiana	31	42	Pennsylvania	87	41
Maine	279	83	South Carolina	8	31
Massachusetts	----------	75			

REQUIREMENTS

Seed certification is a system of official inspection whereby the quality of the potato-seed stock may be guaranteed. At present potato-seed certification is being carried on in 26 States and in every Canadian Province.

It is purely voluntary on the part of seed-potato growers in the States and Provinces in which the service is available. In many States, however, the applicant for seed certification must previously have submitted to the official in charge of the certification work a sample of the seed stock he proposes to plant, or he must plant certified seed approved by that official. A number of States also require that an isolated seed plot be maintained.

All seed-potato certification agencies have promulgated rules and regulations designed to insure a high degree of freedom from disease. Practically all these agencies require that two field inspections of the growing plants and a subsequent examination of the tubers at the bin or shipping point be made by their authorized inspectors before they will issue certification tags. This procedure guarantees the purchaser and user that such seed is free from any

appreciable amount of tuber-borne diseases, especially those of the virus type. While there are differences in the percentage of disease tolerated in the different seed-producing States, they are not sufficiently great to materially affect the quality of the seed. Certain requirements as to trueness to name, freedom from varietal mixture, vigor of plants, yield, tuber type, percentage of mechanical injuries, etc., are also made in seed certification. The personal factor is generally recognized as of greater importance than rigidity of rules and regulations.

The producer of high-grade seed potatoes is justly entitled to a fair monetary return for the special efforts he has made to produce high-quality seed stock, especially if he has maintained a seed plot year after year and his crop has been officially inspected and passed by an authorized seed-certification inspection officer.

VOLUME OF PRODUCTION

The extent of the seed-potato certification movement and the volume of production are indicated by table 2, which gives for 1926–35 the production, in bushels, of certified seed potatoes in the 26 States in which seed certification has been undertaken. The volume of production has fluctuated from year to year. It reached a maximum of 12,100,060 bushels in 1935.

TABLE 2.—*Production of certified seed potatoes (bushels) in 26 States, 1926–35* [1]

State	1926	1927	1928	1929	1930
California	12,075	17,800	12,000	11,768	4,200
Colorado	31,300	77,105	57,890	71,450	51,945
Idaho	371,479	866,162	349,509	203,717	314,803
Kentucky	22,920	25,500	8,754	21,117	9,050
Maine	2,294,845	3,278,101	5,094,128	3,998,902	2,709,554
Maryland	18,390	32,078	21,581	40,488	16,808
Michigan	337,000	162,397	854,742	741,215	212,125
Minnesota	693,685	621,999	1,162,540	911,099	548,291
Montana	113,365	180,562	236,499	72,380	68,962
Nebraska	60,200	181,500	152,400	462,450	663,000
New Hampshire	2,695	14,778	17,250	9,264	34,960
New Jersey	92,916	[2] 475	100,355	62,286	49,666
New York	225,371	323,080	470,528	572,100	715,835
North Dakota	181,400	321,305	539,855	412,300	372,000
Ohio	5,600	6,300	6,150	6,400	4,800
Oregon	46,000	87,840	154,237	137,711	74,050
Pennsylvania	41,115	29,870	60,490	69,760	46,016
South Dakota	28,441	49,856	59,309	59,206	27,790
Vermont	160,031	252,582	136,119	136,531	132,850
Washington	30,300	121,350	81,825	76,900	85,085
Wisconsin	196,500	243,000	448,400	293,360	261,391
Wyoming	138,000	259,500	350,000	185,500	299,780
Total	5,103,628	7,153,140	10,374,561	8,555,904	6,702,961

[1] Data from the Hay, Feed, and Seed Division, Bureau of Agricultural Economics, U. S. Department of Agriculture.

[2] The second crop developed primary leaf-roll symptoms, and nearly all fields were rejected

TABLE 2.—*Production of certified seed potatoes (bushels) in 26 States, 1926–35*—Continued

State	1931	1932	1933	1934	1935
California	8,102	6,770	12,467	20,450	71,083
Colorado	95,580	122,530	505,965	425,044	352,458
Idaho	226,066	151,497	212,394	136,404	107,273
Kentucky	9,088	11,800	12,210	9,110	7,135
Louisiana				37,000	11,940
Maine	3,944,036	2,920,600	3,852,796	6,003,342	5,872,000
Maryland	65,948	57,408	72,572	94,713	45,710
Michigan	193,642	370,664	271,780	348,880	217,206
Minnesota	662,528	437,266	602,105	658,818	1,345,313
Montana	62,142	63,965	60,845	67,450	120,072
Nebraska	384,000	392,001	552,263	195,623	814,705
New Hampshire	39,650	12,925	29,666	35,325	27,846
New Jersey	114,168	83,899	123,908	106,540	44,095
New Mexico					7,000
New York	819,220	550,042	520,000	544,000	415,300
North Carolina				41,500	20,500
North Dakota	413,000	824,620	918,150	628,310	1,430,300
Ohio	6,000	7,000	8,000	400	5,000
Oregon	136,635	188,210	185,300	187,400	130,170
Pennsylvania	91,113	103,247	137,165	241,789	147,154
South Dakota	37,938	40,175	3,945	7,010	19,827
Utah				36,550	42,150
Vermont	219,140	179,042	183,100	209,800	154,915
Washington	115,363	93,301	101,966	101,435	99,508
Wisconsin	258,596	172,900	149,450	179,918	201,700
Wyoming	187,338	130,935	303,950	143,050	389,700
Total	8,089,293	6,920,797	8,819,997	10,459,865	12,100,060

Maine has easily been the leader in volume of production.

Figures on the production of certified seed of 10 of the leading commercial varieties in the United States, as given in table 3, show that the Irish Cobbler, Green Mountain, and Triumph varieties lead in number of bushels certified.

TABLE 3.—*Production of certified seed potatoes (bushels) in the United States, by varieties, 1926–35* [1]

Variety	1926	1927	1928	1929	1930
Irish Cobbler	1,969,042	2,262,239	3,562,126	2,593,869	1,843,473
Triumph	418,546	976,826	1,337,496	1,233,769	1,157,980
Spaulding Rose	595,647	597,430	791,995	483,539	410,280
Early Ohio	172,263	153,478	224,653	186,967	182,279
Burbank	18,100	38,955	68,288	82,092	30,330
Russet Burbank (Netted Gem)	529,157	1,026,592	550,721	313,961	439,593
Green Mountain	798,917	1,571,267	2,479,174	2,230,965	1,679,078
Charles Downing (Idaho Rural)	13,958	52,398	15,085	14,276	15,883
Rural New Yorker No. 2	541,882	134,196	261,571	268,074	243,042
Russet Rural	345,454	200,675	925,826	894,933	414,797

Variety	1931	1932	1933	1934	1935
Irish Cobbler	2,945,996	2,205,961	2,822,283	3,827,237	4,782,641
Triumph	939,113	1,003,269	1,443,172	881,120	2,246,110
Spaulding Rose	577,772	221,674	367,903	489,110	336,700
Early Ohio	280,528	366,605	450,505	235,776	435,511
Burbank	40,533	26,690	53,800	39,100	26,200
Russet Burbank (Netted Gem)	384,179	334,066	420,735	401,398	326,294
Green Mountain	2,722,315	1,640,152	1,842,097	3,062,020	2,583,255
Charles Downing (Idaho Rural)	6,425	6,115	6,392	1,925	4,250
Rural New Yorker No. 2	237,739	225,918	245,047	281,013	143,793
Russet Rural	451,169	589,659	475,640	556,449	346,239
Other varieties		300,688	692,423	744,713	862,067

[1] Data from the Hay, Feed, and Seed Division, Bureau of Agricultural Economics, U. S. Department of Agriculture.

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It is obvious from the foregoing information on the value of certified seed potatoes and the extent of their production that not all growers of potatoes for either commercial or home use are yet fully convinced of the advantage of planting certified seed.

Even after more than 20 years of seed certification less than one-fourth of the total potato acreage of the United States is planted with certified seed. The reason for this seeming neglect by growers may well be considered. The data in table 1 clearly show a distinct gain in yield, ranging from 31 to 219 bushels an acre, from the use of certified seed. Obviously, failure to use certified seed cannot be ascribed to lack of performance of the seed in increasing yield.

Two factors are probably involved in this failure: (1) Price difference between certified and uncertified seed; and (2) indifference of the grower to quality of seed. In regard to the first factor, purchasers of certified seed may consider that many growers demand a larger price premium than is warranted. However, the price premium is partly justified by the exacting demands of the purchaser in regard to freedom of the tubers from mechanical injuries, from surface diseases such as common scab and rhizoctonia, and from undersized and oversized potatoes. To meet purchasers' requirements the grower must often discard a considerable percentage of his stock, thereby reducing his profits. In order to reduce such grading losses the grower must select land as free from scab and rhizoctonia infestation as possible; he must control the size of tubers by closer planting or the use of larger seed pieces, and he must lessen mechanical injury by more careful harvesting and handling.

By observing such practices the grower can lessen materially the percentage of the crop that fails to come within grade requirements and thereby remove the necessity for demanding a seemingly high premium for his seed stock.

The use of bogus seed-certification tags has also seriously curtailed the use of certified seed, because of the poor performance of stock so tagged and the failure of the purchaser or user to recognize that it was not bona fide certified seed. The would-be purchaser of certified seed should learn to distinguish between genuine and bogus seed-certification tags.

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